



# Smart Hire: AI-Driven Recruitment and Coding Assessment System

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## How to Cite this Article:

Sowndarya.V, Oviya.R, Subhiksha.S, K, I. & Varshini.G, (2026). Smart Hire: AI-Driven Recruitment and Coding Assessment System. International Journal of Creative and Open Research in Engineering and Management, <i>02</i>(04).

<https://doi.org/10.55041/ijcope.v2i4.226>

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## ABSTRACT

Traditional recruitment systems rely heavily on manual screening and static evaluation methods, which often lead to inefficiencies, bias, and limited insight into candidate capabilities. The Smart Hire AI-Driven Recruitment and Self-Assessment Platform addresses these limitations by introducing an intelligent, full-stack web-based solution that enables automated, data-driven technical hiring. The system adopts an AI-assisted evaluation approach to continuously assess candidate performance through coding challenges, mock interviews, and structured assessments, eliminating dependency on one-time evaluation processes.

The platform integrates a dynamic performance tracking module that monitors user progress over time, capturing metrics such as problem-solving efficiency, accuracy, and skill proficiency. These metrics are processed to generate personalized feedback, enabling candidates to identify strengths and improvement areas. On the recruiter side, a centralized analytics dashboard provides real-time insights into candidate performance, facilitating efficient shortlisting and informed hiring decisions through data visualization and automated reporting.

The backend architecture is implemented using Spring Boot with Spring Security for role-based access control and BCrypt hashing to ensure secure credential management. A scalable system design supports concurrent user interactions, while RESTful APIs enable seamless communication between

frontend and backend components. The frontend interface is designed to be responsive and user-friendly, ensuring accessibility across multiple devices and enhancing user engagement.

The system further incorporates automated evaluation mechanisms to reduce manual intervention in recruitment workflows, improving efficiency and consistency. Experimental usage indicates improved candidate assessment accuracy and reduced processing time compared to traditional methods. Future enhancements include advanced AI-based recommendation models, adaptive learning pathways, and integration with external job platforms to extend functionality and scalability.

**Keywords:** AI-driven recruitment, technical hiring automation, self-assessment platform, continuous performance evaluation, behavioral skill tracking, coding assessment system, mock interview framework, data-driven hiring, recruiter analytics dashboard, automated evaluation, Spring Boot, Spring Security, BCrypt hashing, RESTful APIs, scalable web architecture, real-time feedback, candidate performance analytics, and responsive web design.



## 1. INTRODUCTION

The Smart Hire AI-Driven Recruitment and Self-Assessment Platform is a web-based application developed to simplify, enhance, and automate the technical hiring process in a structured and efficient manner. In today's competitive job market, both candidates and recruiters face challenges such as lack of personalized assessment, time-consuming evaluation processes, and limited access to realistic interview practice. This platform addresses these challenges by providing an integrated, AI-driven environment that supports skill development, performance analysis, and smart recruitment.

The system offers a unified space where candidates can practice technical interviews, strengthen their coding abilities, and receive AI-based feedback to improve their overall performance. At the same time, recruiters are provided with a centralized and structured dashboard that enables them to evaluate candidate skills, monitor progress, and make informed hiring decisions based on real-time data and analytics.

The platform operates with two primary roles: Candidate and Admin (Recruiter). Candidates can upload resumes, attend mock interviews, and participate in technical coding rounds. The system intelligently analyzes uploaded resumes to extract key information such as skills, programming languages, and project experience, and generates personalized technical questions accordingly.

Additionally, the platform includes a voice-based mock interview module, where user responses are captured through speech-to-text technology and analyzed to detect filler words, fluency, and communication clarity, ultimately generating a confidence score. For technical evaluation, the system provides a built-in multi-language code editor supporting Java, Python, and C++, where the backend compiles and executes code in real time and validates outputs against predefined test cases.

Overall, the platform aims to create a more efficient, transparent, and intelligent recruitment ecosystem by combining automation, real-time evaluation, and AI-driven insights, thereby benefiting both candidates and recruiters.

## 2. RELATED WORK

The field of intelligent recruitment and online technical assessment has evolved significantly with the advancement of web technologies and artificial intelligence. Several platforms and research works have contributed to improving the hiring process by introducing automation, data-driven evaluation, and skill-based assessments.

One of the most widely used platforms in technical recruitment is HackerRank, which provides an online coding environment where candidates can solve programming problems and participate in coding contests. It allows recruiters to evaluate candidates based on their coding performance, problem-solving ability, and efficiency. Similarly, LeetCode offers a vast collection of coding problems that help candidates prepare for technical interviews. However, these platforms primarily focus on coding skills and do not provide a complete recruitment workflow or personalized feedback based on candidate profiles.

Another platform, CodeSignal, introduces standardized coding assessments and scoring mechanisms that enable companies to compare candidates objectively. It also includes automated evaluation features and supports multiple programming languages. Despite its advantages, it lacks integration with features such as resume-based question generation and communication skill analysis, which are essential for a holistic hiring process.

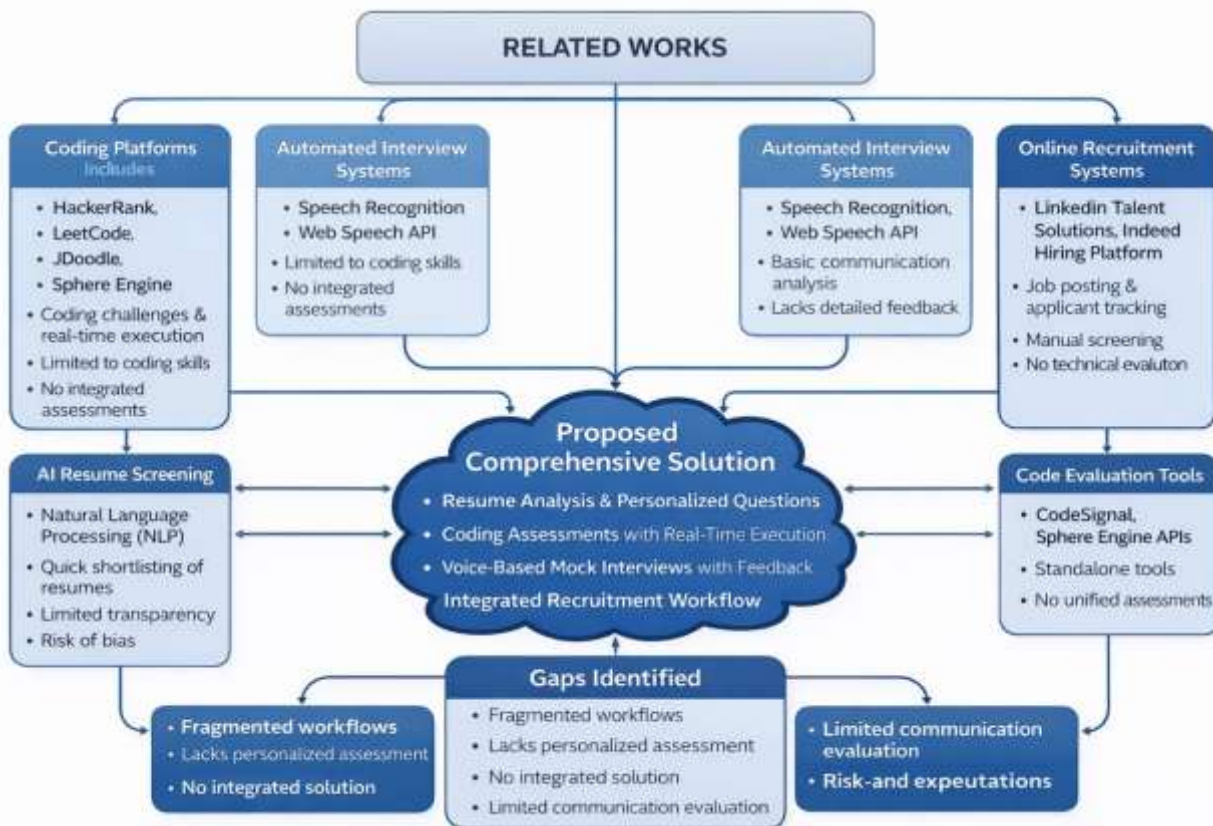
In the area of online recruitment systems, platforms like LinkedIn Talent Solutions and Indeed Hiring Platform provide tools for job posting, applicant tracking, and candidate filtering. These systems are efficient in managing large volumes of applications but rely heavily on manual screening and do not offer in-depth technical evaluation or AI-driven mock interview features.

Recent research has also explored the use of Artificial Intelligence in recruitment systems. AI-based resume screening tools use Natural Language Processing (NLP) techniques to extract relevant information such as skills, experience, and education from resumes. These systems help in shortlisting candidates quickly, but they often lack transparency and may introduce bias if not properly trained.

In addition, automated interview systems have been developed to evaluate candidate communication skills. These systems use speech recognition and text analysis to assess fluency, confidence, and response quality. Technologies such as the Web Speech API enable real-time speech-to-text conversion, making it possible to analyze spoken responses. However, many



existing solutions focus only on basic speech recognition and do not provide detailed feedback such as filler word detection or confidence scoring.



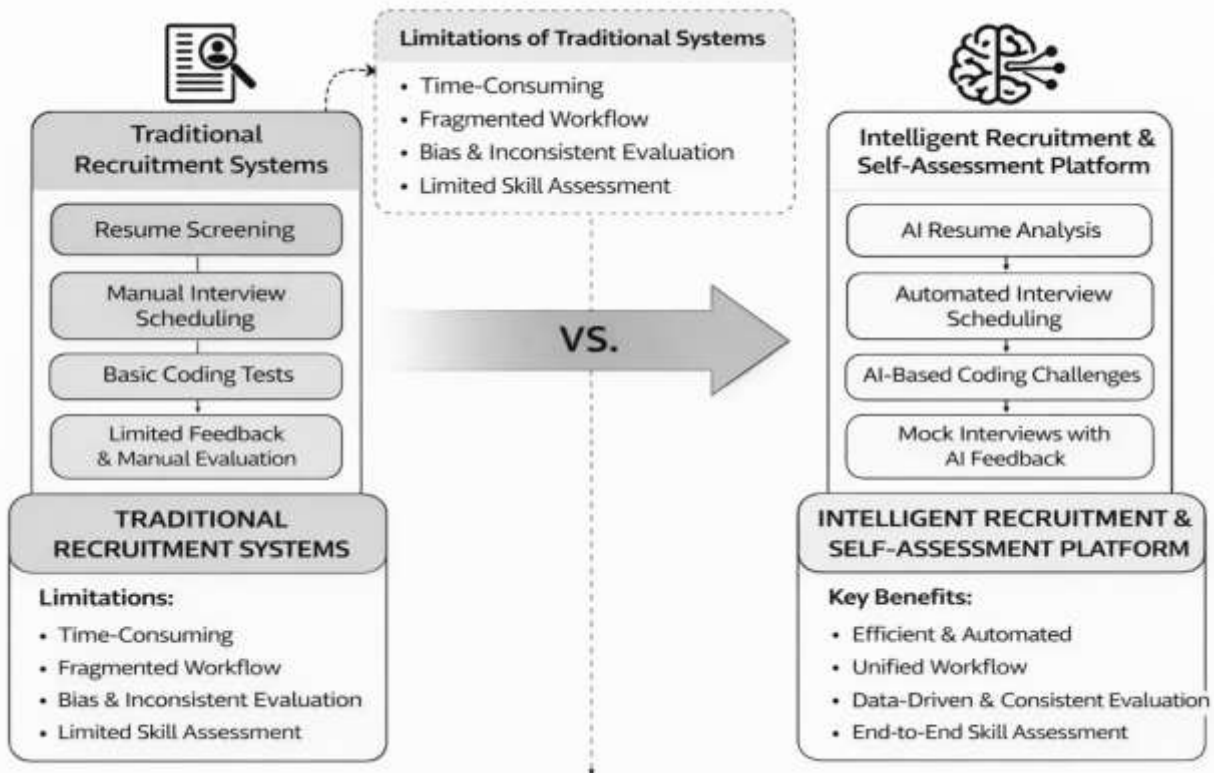
Online coding platforms with real-time code execution, such as JDoodle and Sphere Engine, provide APIs that allow developers to compile and run code in multiple programming languages. These tools are widely used in educational and assessment platforms but are often integrated as standalone services rather than part of a complete recruitment ecosystem.

Despite the availability of these platforms and technologies, there is still a gap in providing a comprehensive solution that combines resume analysis, personalized question generation, coding assessment, and communication skill evaluation within a single system. Most existing systems focus on one or two aspects of the hiring process, leading to fragmented workflows and inefficiencies.

The proposed Intelligent Recruitment and Self-Assessment Platform aims to overcome these limitations by integrating multiple functionalities into a unified system. It combines AI-based resume analysis, voice-based mock interviews, coding assessments with real-time execution, and performance analytics within a single platform. This holistic approach not only enhances candidate preparation but also enables recruiters to make more accurate and data-driven hiring decisions.



Furthermore, the use of modern technologies such as React for frontend development, Spring Boot for backend services, and MySQL for database management ensures scalability, performance, and efficient data handling.



### 3.METHODOLOGY

The methodology of the Smart Hire AI-Driven Recruitment and Self-Assessment Platform describes the systematic approach followed to design, develop, and implement the system in an efficient and scalable manner. The platform is developed as a web-based application using React for the frontend, Spring Boot for backend services, and MySQL for database management, ensuring smooth data handling and high performance.

The process begins with user registration and authentication, where both candidates and recruiters create accounts and log in securely. Spring Security is used to implement role-based authentication, ensuring that users can only access features relevant to their roles. Passwords are encrypted using BCrypt, enhancing data security and preventing unauthorized access.

Once logged in, candidates can upload their resumes in PDF format. The system processes the uploaded documents using parsing techniques to extract key information such as skills, programming languages, frameworks, education, and project experience. This extracted data is stored in the database and used for further analysis.

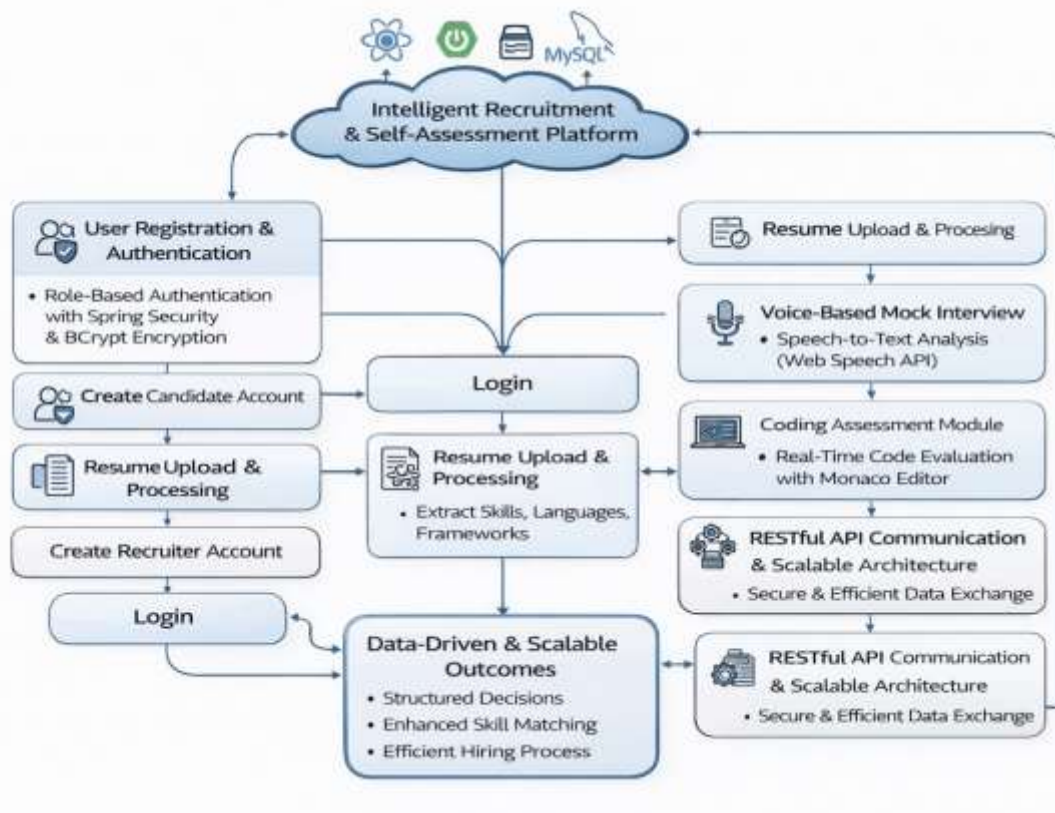
Based on the extracted information, the platform generates personalized technical questions tailored to the candidate's profile. This adaptive question generation helps simulate real-world interview scenarios and ensures that candidates are evaluated based on their actual skill set and experience.

The platform also includes a voice-based mock interview module, where candidates respond to questions using voice input. The system utilizes the Web Speech API to convert speech into text in real time. The responses are then analyzed to detect filler words, pauses, and fluency, and a confidence score is calculated to evaluate communication skills and clarity.

In addition to interview practice, the methodology includes a technical coding assessment module. Candidates can solve programming problems using a built-in code editor powered by the Monaco Editor, which supports multiple programming languages such as Java, Python, and C++. The backend compiles and executes the code in real time and validates outputs against predefined test cases to ensure correctness and efficiency.



The system also incorporates a performance evaluation and analytics module, where candidate results are recorded and analyzed. Recruiters can view detailed reports, including coding scores, interview performance, and overall assessment metrics through a centralized dashboard. This enables data-driven decision-making and reduces manual evaluation efforts.



Furthermore, the platform ensures efficient frontend-backend communication using RESTful APIs, allowing seamless data exchange and real-time updates. The architecture is designed to be scalable and modular, making it easy to add new features such as AI-based recommendations, advanced analytics, and integration with external job portals in the future.

Overall, the methodology focuses on creating a secure, scalable, and intelligent system that integrates multiple components such as resume analysis, mock interviews, coding assessments, and performance tracking into a unified recruitment platform.

#### 4. PLATFORM FEATURES AND FUNCTIONALITIES

The Smart Hire AI-Driven Recruitment and Self-Assessment Platform is a smart, interactive system designed to replicate real interview scenarios using advanced technologies like Artificial Intelligence (AI), Natural Language Processing (NLP), and Machine Learning (ML). It provides an automated and personalized platform for assessing both technical and communication skills of candidates.

One of the key advanced features is context-aware conversation handling, where the chatbot understands the flow of the interview and asks follow-up questions based on previous responses. This creates a more human-like interaction and improves the depth of evaluation.

The system includes a semantic analysis engine, which goes beyond keyword matching and evaluates the meaning of candidate responses. It checks whether the answer logically addresses the question, improving the accuracy of assessment compared to traditional systems.

Another important functionality is emotion and sentiment analysis, where the chatbot analyzes tone, confidence, and hesitation in voice responses. This helps in evaluating soft skills such as confidence, positivity, and communication effectiveness.



The platform also supports a multi-domain interview system, allowing candidates to choose different domains such as Java, Web Development, Database Management, or HR interviews. Each domain contains a structured set of questions categorized into beginner, intermediate, and advanced levels.

A time-based assessment feature is implemented to simulate real interview pressure. Candidates are required to answer within a given time limit, helping them improve time management and decision-making skills.

The chatbot includes a smart feedback engine, which provides detailed insights such as:

- Strengths and weaknesses
- Suggested improvements
- Recommended topics for practice

This makes the platform not just an assessment tool but also a learning assistant.

The system also offers data visualization and analytics, where performance metrics are displayed using charts and graphs. Candidates can track their improvement trends, while recruiters can compare multiple candidates based on standardized metrics.

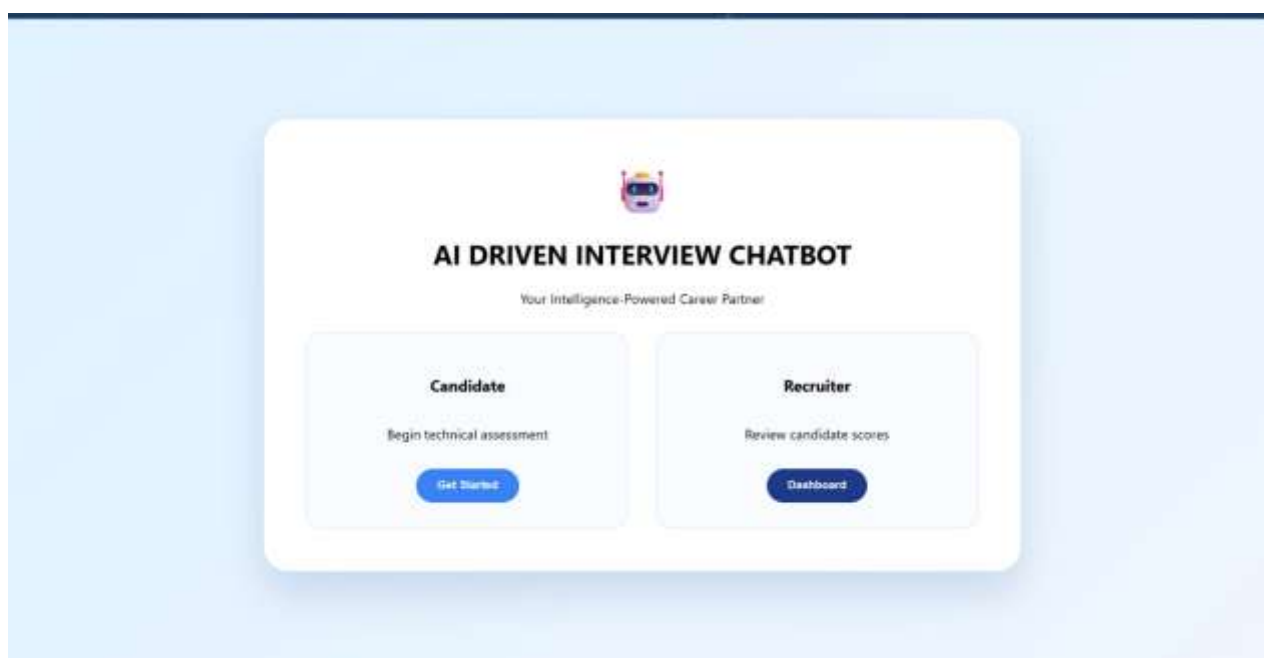
To enhance usability, the platform includes session recording and replay functionality, allowing candidates to review their past interviews and analyze their mistakes. This feature is especially useful for self-improvement and preparation.

The chatbot is integrated with a secure authentication system, ensuring that user data is protected. It also maintains session management, allowing users to pause and resume interviews without losing progress.

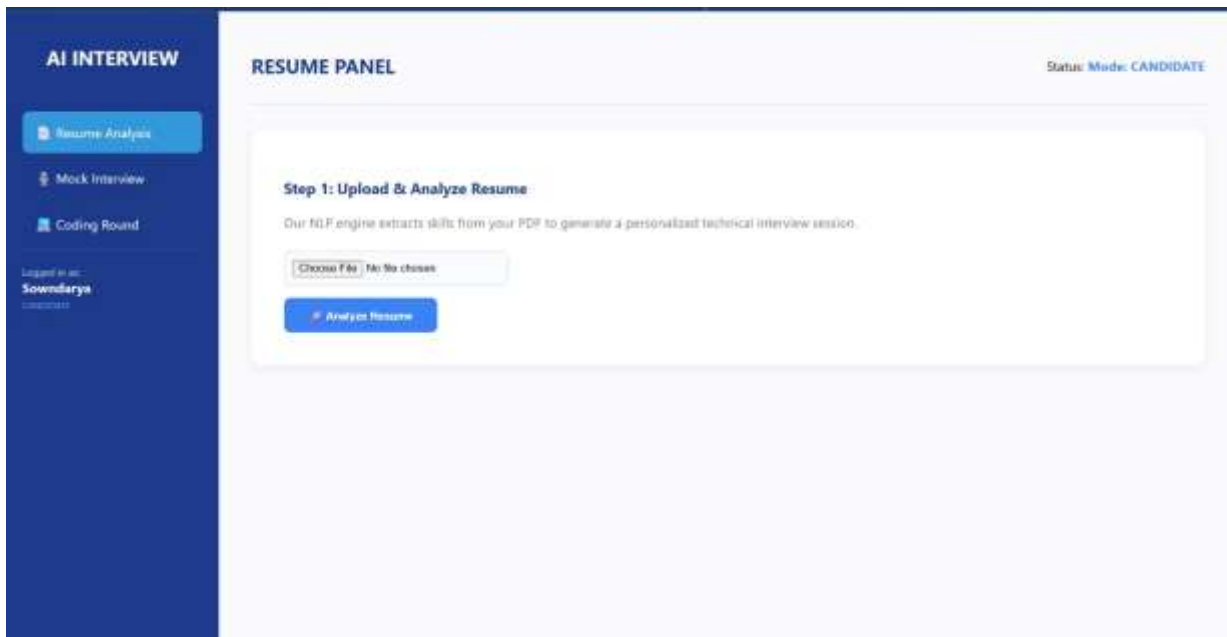
From a technical perspective, the system uses RESTful APIs for communication between frontend and backend, ensuring smooth data exchange. The architecture is designed to be scalable and cloud-ready, enabling it to handle multiple users simultaneously without performance issues.

Additionally, the platform can be extended with AI-based recommendation systems, which suggest job roles, interview questions, or learning resources based on candidate performance.

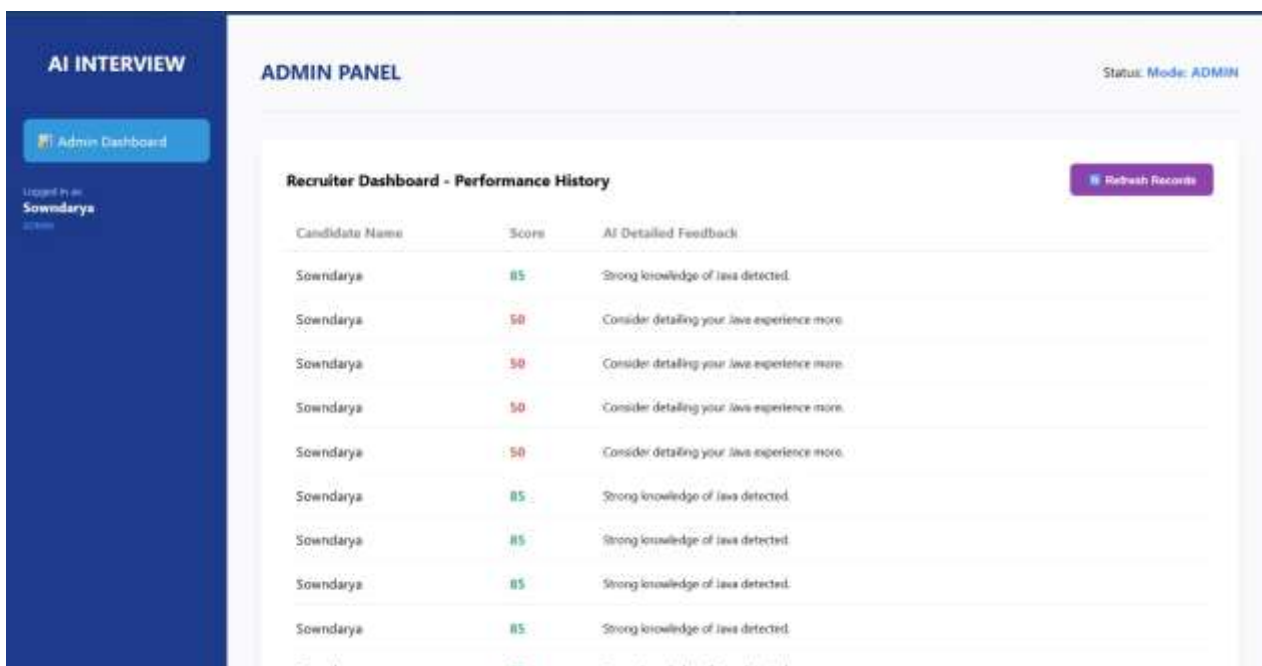
Overall, the AI-Driven Interview Chatbot provides a comprehensive, intelligent, and scalable solution that enhances both candidate preparation and recruitment efficiency by combining automation, real-time analysis, and personalized feedback.



## 1: LOGIN PAGE



## 2: CANDIDATE DASHBOARD



## 3: ADMIN DASHBOARD

### 5. CONCLUSION AND FUTURE WORKS

The Smart Hire AI-Driven Recruitment and Self-Assessment Platform provides a comprehensive and efficient solution to modernize the technical hiring process by integrating resume analysis, mock interviews, and coding assessments into a single unified system. By leveraging automation and intelligent evaluation techniques, the platform enables candidates to practice real-time interview scenarios, improve their technical and communication skills, and receive structured feedback for continuous growth.

From the recruiter's perspective, the system offers a centralized dashboard to monitor candidate performance, analyze assessment results, and make informed hiring decisions based on data-driven insights. The use of modern technologies such as React, Spring Boot, and MySQL ensures high performance, scalability, and secure data management. Overall, the platform significantly reduces manual effort, minimizes bias, and enhances the efficiency and transparency of the recruitment process.



In addition, the platform promotes a standardized evaluation process, ensuring that all candidates are assessed based on consistent criteria. This improves fairness in hiring and helps organizations identify the most suitable candidates based on their actual skills and performance rather than just resumes.

The platform can be further enhanced by integrating advanced Artificial Intelligence (AI) and Machine Learning (ML) algorithms to provide deeper and more accurate analysis of candidate responses and coding performance. These technologies can enable predictive insights, such as estimating candidate success rates or recommending suitable job roles based on skill patterns.

Implementing cloud-based deployment (such as AWS or Azure) will improve scalability, reliability, and accessibility, allowing the system to handle a large number of users simultaneously.

The platform can also be integrated with professional networks like LinkedIn and job portals to streamline the recruitment workflow, enabling direct candidate sourcing, profile verification, and job matching.

Furthermore, features such as real-time collaboration coding environments, AI-based proctoring systems to prevent malpractice, and automated report generation can be added to enhance functionality and security. In the future, the system can evolve into a complete recruitment ecosystem, combining intelligent assessment, candidate training, and hiring management into a single platform, making it a powerful tool for both organizations and job seekers.

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